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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,038	08/30/2001	Yoshihiro Mori	0819-0637	7302

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EXAMINER

HUYNH, YENNHU B

ART UNIT PAPER NUMBER

2813

DATE MAILED: 12/16/2002

12

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/942,038

Applicant(s)

MORI ET AL.

Examiner

Yennhu B Huynh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspond nce addr ss --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 November 1937.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the Amendment filed on 10/29/02.

Election/Restrictions

Applicant's election without traverse of 10-15 in Paper No. 7 is acknowledged.

Claim 10 has been canceled by Amendment filed on 10/29/02.

Drawings

The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 10/29/02 have been accepted.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

The application has been amended as follows:

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The title has been changed as follows: A Method For Fabricating Semiconductor Device Including Annealing Bottom Electrode With Hydrogen In A Reducing Atmosphere Before Capacitor Insulating Film Forming.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 11-18, 20-22, 24, 25, 27-29, 31-33, 35 & 36 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsuzumitani et al. (US. 2001/0023977 A1).

Tsuzumitani et al. disclose a semiconductor device, which include:

-Claims 11-18, 20-22, 24, 25, 27-29, 31-33, 35 & 36: a lower capacitor electrode made of Pt, Ru, Ir or a compose of RuO₂, RuO₄ noble metal film 13 (p. 2,[0006, 0017]); annealing the electrode in a reducing atmosphere, non – oxidizing atmosphere, contains hydrogen gases (p.2 & 3, [0019, 0024, 0027, 0053, 0058, 0078]); then a capacitor dielectric film 14 made of BST, SBT, Ta₂O₅ formed and a upper capacitor electrode 15 formed on the dielectric layer (page 3, [0058]).

Claims 11-18, 20-22, 24, 25, 27-29, 31-33, 35 & 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsunemine et al. (IEEE 1998, pp 30.3.1-30.3.4).

Tsunemine et al. disclose substantially all of claimed inventions, which include noble electrodes made of Pt, capacitor dielectric made of BST, Ta₂O₅ and the lower electrode is annealing with hydrogen before forming the capacitor dielectric (p.30.3.1 right column & p.30.3 2, left column, first paragraph, fig. 6).

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 19,23,26,30,34 & 37 are rejected under 35 U.S.C. 103(a) as being unpatentable Tsuzumitani et al. (US. 2001/0023977 A1) and Tsunemine et al. (IEEE 1998, pp 30.3.1-30.3.4) in view of Sun et al. (IEEE 1997, pp 10.3.1-4).

Tsuzumitani et al. and Tsunemine et al. disclose substantially all of claimed invention, except wherein the electrode made of Rh and dielectric made of PZT.

Sun et al. disclose an effect of bottom electrode annealing in an atmosphere that contains nitrogen/hydrogen and that has been created as the reducing atmosphere (p.10.3.1), and showing bottom electrodes are resistant to hydrogen damage (p.10.3.2, left col., 2nd paragraph).

-Re. claims 19,23,26,30,34 & 37: wherein the capacitor electrodes made of PZT and BST (p.10.3.1, left col.)

It is well known to one having skill in the art to use a Rh electrodes in place of Ru or Ir or Pt. Since the substitution of art recognized equivalent as suggested would have within level of those skilled in the art.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Tsuzumitani et al. or Tsunemine et al. by

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incorporating the Rh electrodes and PZT dielectric, because with the Rh superior electrical with reliability characteristics, and the high PZT dielectric constant, the leakage current problem will be improved.

Response to Arguments

Applicant's arguments filed 10/29/02 have been fully considered but they are not persuasive.

Contrary to the Applicant's argument in Remark that Sun et al. do not disclose a hydrogen annealing to lower electrode before the dielectric film formed.

Examiner agrees that Sun et al. do not clearly indicate annealing the lower electrode before the dielectric forming, but Sun disclose that the bottom electrode is resistant to hydrogen damage and susceptible to hydrogen damage.

However, both Tsuzumitani et al. at (p.2 & 3, [0019, 0024, 0027, 0053, 0058, 0078]), and Tsunemine et al. (p.30.3.1 right column & p.30.3 2, left column, first paragraph, fig. 6), teaching the bottom electrode having a hydrogen annealing into before the dielectric film forming.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yennhu B. Huynh whose telephone number is 703-308-6110. The examiner can normally be reached on M-F 8.30AM-7.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

YNBH,

12/8/02


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800